IGHT AND LIGHTING

XXXVI.—No. 9 September, 1943 Price 9d.

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THE enormous volume of gas being saved to-day by public lighting engineers goes to meet the fuel needs of the war factories, where other watchful engineers see that every cubic foot is used to the greatest advantage. For gas to-day is vital: gas has gone to war.

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Light and Lighting

Official Journal of the Illuminating Engineering Society.

Incorporating "The Illuminating Engineer."

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Edited by J. STEWART DOW

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	Page
Editorial Notes ...	127
Notes and News ...	128
I.E.S. Meetings	129
Lighting for Production	132
An Australian Code of Factory Lighting ...	136
Traffic Safety in War Time	142
Inspection of Precious Metals	143
The Editor Replies ...	145

"In the Beginning was the Word"

MR. CHURCHILL, who recently quoted this venerable maxim, is himself a living and inspiring example of the power of words rightly applied, whether written or spoken.

There is a natural tendency in such times as these to exalt men of action. Let it not be forgotten, however, that thought must precede successful action; also that words such as arouse hope, stimulate imagination, and kindle generous enthusiasm are often the forerunners of deeds that shape the future.

In our own field, lighting, let us not forget the power of words. Every illuminating engineer should believe in his message and should have the skill to convey it. When the opportune moment for urging the claims of "lighting reconstruction" arrives, let us be prepared with a well-expressed and effectively illustrated statement of our case.

Road Accidents in War-time

A booklet issued by the Ministry of War Transport reviews road accidents during the first four years of war. During blackout hours 10,566 people in Great Britain have been killed since the war began—and probably about twenty times as many injured. There has been, as in the last war, a progressive diminution in the number of accidents, due partly to diminished traffic and partly to adaptation by the public to abnormal conditions; but even now, though all unnecessary traffic has been virtually abolished, more people are being killed on the roads than in peace-time. During winter months six out of every ten road deaths occurred during hours of darkness. In the case of adult people, of ages from fifteen to sixty, by far the greater proportion of accidents (roughly, 80-90 per cent.) take place during hours of darkness; accidents to children, on the other hand (who are naturally in bed during hours of darkness), occur almost exclusively in daylight. Figures for successive years are difficult to compare for many reasons—for example, the influence of "daylight saving" (now practised throughout the entire year). As regards the effect of the blackout, however, the fundamental causes are evident—difficulty of drivers in seeing pedestrians under present conditions, and inability of pedestrians to realise that, in present circumstances, the range at which they are visible is much reduced.

Courses in Illuminating Engineering

We learn with interest that an evening course, designed to prepare candidates for the City and Guilds of London Institute examination in Illuminating Engineering (Intermediate Grade), is being arranged at the College of Technology, Leeds. Entrants should be at least sixteen years of age, and should have attained School Certificate Standard in mathematics and physics. The illuminating engineering course occupies two evenings a week during the second and third years. Intending students should communicate with the Principal of the College of Technology, Cookbridge-street, Leeds, 2.

Forthcoming I.E.S. Meetings

(Provisional List)

SESSIONAL MEETINGS IN LONDON

1943.

Oct. 12th. Mr. W. R. Stevens on **The Design and Application of fittings for Tubular Fluorescent Lamps.** (*Sessional Meeting to be held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **5 p.m.**

Nov. 9th. Mr. W. F. T. Souter on **The Lighting of Public Buildings.** (*Sessional Meeting to be held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **5 p.m.**

MEETINGS OF CENTRES AND GROUPS

1943.

Oct. 4th. Address by Mr. J. B. Harris (Chairman of the Centre). (*Meeting of the Bath and Bristol Centre to be held in the Pump Room, Bath.*) **7 p.m.**

Oct. 4th. "Brains Trust." (*Meeting of the Leeds Centre to be held in the Leeds Corporation Electricity Showrooms, The Headrow, Leeds.*) **5.15 p.m.**

Oct. 5th. Mr. R. Gillespie Williams on **The Poetry of Light.** (*Meeting of the Derby Group to be held in the Derby Electricity Showrooms, Irongate, Derby.*)

Oct. 5th. Mr. G. A. Cope on **An Architect's Viewpoint.** (*Meeting of the Leicester Group, to be held in the Electricity Department Demonstration Theatre, Charles Street, Leicester.*) **6 p.m.**

Oct. 6th. Mr. J. H. Napper on **Lighting in Relation to Town and Country Planning.** (*Meeting of the Newcastle Centre to be held in the Minor Hall, Oxford Street, Newcastle-on-Tyne.*) **5.30 p.m.**

Oct. 9th. Dr. J. H. Shaxby on **Physiological Aspects of Lighting.** (*Meeting of the Cardiff Centre to be held in the Mackworth Hotel, Swansea.*)

Oct. 14th. Mr. J. W. Howell on **Lighting in the Textile and Finishing Trades.** (*Meeting of the Manchester Centre, to be held in Reynolds Hall, College of Technology, Sackville Street, Manchester.*) **2.30 p.m.**

Oct. 14th. Mr. R. Gillespie Williams on **Post-War Developments in Colour Lighting.** (*Meeting of the Bradford Group in the Electricity Department Showrooms, Sunbridge Road, Bradford.*) **6.45. p.m.**

1943.

Oct. 15th. Address by Mr. A. J. Pashler (Chairman). (*Meeting of the Birmingham Centre to be held at the Imperial Hotel, Temple Street, Birmingham.*) **6 p.m.**

Oct. 29th. Address by Mr. J. W. Howell. (*Joint Meeting of the Glasgow Centre with the Society of Dyers and Colourists, to be held in the St. Enoch Hotel, Glasgow.*) **6.30 p.m.**

Oct. 29th. Lighting Reconstruction. A General Discussion to be opened by Mr. R. Gillespie Williams. (*Meeting of the Nottingham Centre to be held in the City of Nottingham Gas Department Demonstration Theatre, Parliament Street, Nottingham.*) **5.30 p.m.**

Nov. 1st. An Address on **Post-War Developments.** (*Meeting of the Bath and Bristol Centre at the Grand Hotel, Bristol.*) **7 p.m.**

Nov. 1st. Mr. W. J. Jones on **Fundamentals of Lighting Design.** (*Meeting of the Leeds Centre, to be held in the Leeds Corporation Electricity Showrooms, The Headrow, Leeds.*) **5.15 p.m.**

Nov. 2nd. Mr. G. H. Bamford, M.B., on **The Eye; Its reaction to Light.** (*Meeting of the Derby Group, to be held in the Derby Electricity Showrooms, Irongate, Derby.*)

Nov. 2nd. Mr. R. Gillespie Williams on **Stage Lighting.** (*Meeting of the Leicester Group, to be held in the Electricity Department Demonstration Theatre, Charles Street, Leicester.*) **6 p.m.**

Nov. 3rd. Mr. J. M. A. Mitchell on **The Development of Illuminating Engineering.** (*Meeting of the Newcastle Centre to be held in the Minor Hall, Oxford Street, Newcastle-on-Tyne.*) **5.30 p.m.**

Nov. 11th. Mr. F. F. Middleton on **Avoiding the Obsolete in Street Lighting.** (*Meeting of the Cardiff Centre, to be held in the Cardiff Corporation Demonstration Theatre, The Hayes, Cardiff.*) **3 p.m.**

Nov. 11th. Mr. W. J. G. Davey on **Short Cuts in Illuminating Engineering.** (*Meeting of the Manchester Centre, to be held in the Reynolds Hall, College of Technology, Sackville Street, Manchester.*) **2.30 p.m.**

Nov. 11th. Mr. T. Jones on **School Lighting.** (*Meeting of the Bradford Group to be held in the Electricity Department's Showrooms, Sunbridge Road, Bradford.*) **6.45 p.m.**

Nov. 12th. A **"Brains Trust."** (*Meeting of the Birmingham Centre to be held at the Imperial Hotel, Temple Street, Birmingham.*) **6.0 p.m.**

(Secretaries of Centres and Groups are requested to send in particulars of meetings in advance, mentioning subject, author, place, date and time of meeting.)

165-Foot Towers

We notice in *Public Lighting* an account of a somewhat unusual street lighting installation, that in Austin, Texas (U.S.A.). This city still retains the steel towers for street lamps, 165 feet high, which were first installed in 1895. The towers were originally equipped with arc lamps (six to each tower). The manufacturer's guarantee was as follows: "We guarantee that with an ordinary pocket watch you will be able to read the time on the darkest night within a circle of 3,000 feet, using the base of the tower as the centre of the circle." The unimproved condition of many of the streets possibly furnished one reason for the Council's decision to adopt these high towers, but, whatever their alleged advantages, they quickly gained the affection of the inhabitants of the city. Of the original thirty-one towers, all but two are still in use. It is recorded that one tower was blown down in a cyclone some years ago and was replaced by thirty ordinary street lights. The residents, however, got up a petition for its restoration (the petition was signed by people residing four miles away who claimed that they could read a newspaper by its light!). Incandescent lamps presently replaced the carbon arcs at the head of each tower. More recently six 400-watt mercury vapour lamps have been substituted on each tower. The first tower thus lighted was set in operation on May 6, 1936, exactly forty-one years after the first tower was lighted with carbon arcs. For the present system many advantages are claimed by the residents of Austin. With the increased candle-power of the new lamps the safety factor, both to homes and pedestrians, has been enhanced. The percentage of burglarised homes in the vicinity of the towers is negligible. The unusual lighting identifies the city easily to Government aircraft, and the effect of the lighting is compared to very bright moonlight, surrounding trees and shrubs appearing in their natural colours, whilst the sky, which appeared only dark with incandescent light, now has a beautiful blue cast!

A Lighting Handbook

Amongst the post-war plans of the I.E.S. in America are the appointment of a full-time technical secretary to serve under the Executive secretary and the publication of a "Lighting Handbook." This is to include the solutions of specific problems in industrial and commercial lighting, as well as the discussion of the general principles of illumination design and methods of calculation. It will be interesting to see what shape this effort assumes. "Handbooks" are apt to materialise as bulky volumes, requiring considerable time and effort for revision—the latter an obvious difficulty when such a subject as illuminating engineering, in course of constant development, is being handled. It has always seemed to us that what is rather needed is a series of relatively small handbooks, dealing first with principles and then with specific fields of lighting, so that each can be revised separately and, if necessary, reprinted at frequent intervals without undue expense.

A SIMPLE WAY TO INCREASE WORKS EFFICIENCY

INSTEAD of basing increased output on extension of space, equipment and personnel, industry should seek higher production levels by securing greater efficiency on the part of each worker, and by speeding up the training of those under instruction.

THE VITAL IMPORTANCE OF LIGHTING. Throughout every stage of organised training, from "raw" recruits to skilled hands, lighting plays a vital part in achieving and maintaining full efficiency. Operatives can work better, more quickly, with less personal strain and consequently fewer accidents and "spoils," if they have really good seeing conditions.

A SCIENTIFIC PROBLEM. Good lighting is not simply a matter of increasing the number and power of the lamps. Lighting in industry is a scientific problem, and its correct solution not only increases efficiency, but may save power and therefore fuel. Lighting is a job for the expert.

AN ADVISORY SERVICE WITHOUT OBLIGATION. Those concerned in the lighting of factories are invited to make use of the Mazda Industrial Lighting Advisory Service which has been established for their assistance. Without obligation, a lighting specialist will examine and report on present lighting arrangements. He may confirm that they are correct, or be able to make suggestions which will result in increased efficiency, happier workers and higher output. You are invited to write for details.

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BTH Research Laboratories have made an intensive study of both the physical and psychological aspects of Lighting in wartime industry, and their knowledge and experience are at your free disposal through the

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Lighting as a Factor in Production

Summary of a paper presented by Mr. W. E. Swale before the Manchester Association of Engineers on June 4, 1943

"I have talked with factory owners who just took it for granted that night workers would produce ten to thirty per cent. less than day-time crews. Yet I have been in other plants where the "darkness shift" was running neck and neck with the rest. What made the difference? In most cases just one thing. Lighting."

These words, quoted from a recent broadcast by an American lighting engineer, served as an introduction to a recent paper, presented by Mr. W. E. Swale before the Manchester Association of Engineers, in which the part played by lighting in industry was reviewed. Whilst admittedly a compilation of existing data rather than a record of personal experience, the paper was a very useful one. (The author also took on the additional task of answering, within a small compass, thirty-one prepared questions, in an appendix to the paper.)

Lighting Legislation

In a brief introductory survey the author recalls some rather disparaging comments by foreign delegates to the I.C.I. (1931) in regard to the antiquated methods of lighting which they saw in many works. He also quotes the remarks, to Mr. H. C. Weston, of the proprietor of a large engineering firm who, in discussing a new lighting scheme, twitted him on "this Sunday school stuff."

The Factory Act of 1937, however, brought reasonable amenities for workers into proper perspective and after Dunkirk the relation of lighting to production received general recognition. Mr. Swale reviewed the history of lighting legislation, alluding to the efforts of Sir Duncan Wilson from 1910 onwards, and reproducing the familiar clauses in the "Factories (Standards of Lighting) Regulations, 1941."

Standards in Foot-Candles

In regard to values of illumination Mr. Swale showed familiarity with the latest developments by reproducing Mr. Weston's table of ascending foot-candles (from 6 to 96 ft.c.), each value being double the preceding one. He urges that sympathetic consideration should be given to the higher ranges of illumination, required for exacting forms of fine work. The figures given for the illumination obtainable from low voltage lamps in local units show that by this means, with the source well screened but brought very close to the work, quite high values are in fact often provided in practice. (Thus with 25 v. 60 w. lamps over 100 ft.c. is obtained at nine inches below the rim of the reflector.) Mr. Swale remarks that "the purchase of reflectors is to some degree an act of faith," but that it is usually false economy to buy anything but the best—three important considerations being correct distribution of light, durability, and ease of maintenance.

Industrial Lighting Installations

In dealing with lighting design and industrial lighting installations allusion is made to the many different considerations which influence the choice of a scheme. Two alternative plans for the lighting of a small brass foundry, based respectively on the use of filament lamps and fluorescent tubes, are discussed. The merits of the latter scheme are noted, i.e. that (1) no new wiring materials are required and little labour needed; (2) illumination is increased about eight times and the operating cost of lighting less than twice; (3) the quality of lighting is much improved.

At the present time economy in the use of new materials is often an important consideration. The conscientious lighting engineer will always examine possibilities of adapting new methods to an existing installation before suggesting that the latter be scrapped. Unfortunately, however, the lighting in older works is often so

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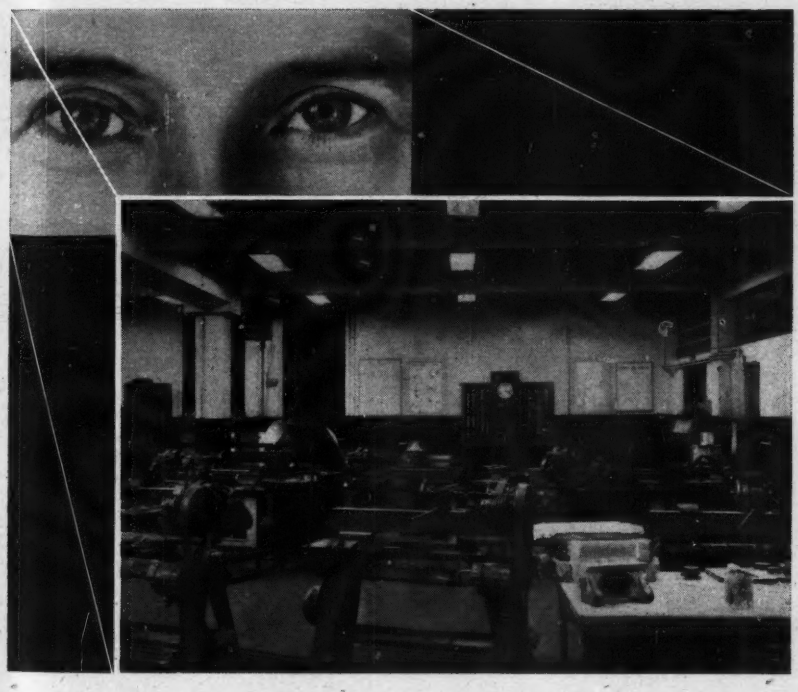

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bad that nothing short of a completely new scheme will be of any use.

Maintenance and Overall Cost

In the next section of the paper Mr. Swale discussed special features of fluorescent tube installations, maintenance and overall cost. The familiar merits of fluorescent lamps (efficiency, colour of light, coolness, etc.) are set out and the problem of lamp replacement touched upon. In this connection the author showed an interesting curve, due to the British Thomson Houston Co., Ltd., showing that with a large group of lamps a steady rate of replacement is ultimately reached. With continuous (twenty-four hours a day) burning the weekly replacement rate, in an installation of 1,000 lamps, will be about eighty-four. Other points mentioned are the avoidance of effects of voltage drop and the loss of light due to absorption in smoky atmospheres—the latter a problem which has recently been the subject of much discussion. The author quotes from "Modern Factory Lighting" to illustrate how annual costs of lighting by different methods may be compared and also reproduces an American schedule analysing such systems in terms of wartime preservation of critical materials.

Does Better Lighting Pay?

In answering the question "Does Better Lighting Increase Production?" the author quotes the results of familiar D.S.I.R. tests relating to typesetting, tile pressing, and silk weaving—for all these processes substantial increases in production with better lighting were secured. He also tabulates the results of an enquiry addressed to the management of seven works in Manchester where relighting was recently undertaken. These questions related to increases in production and improvement in quality, reduction in spoiled material, decreases in accidents and time lost, improvement in well-being of workers, etc. Although as might be expected, little numerical data were thus elicited, it appears that in almost every case the replies conceded that there had been *some* improvement.

Reviews of Books

"*Modern Industrial Lighting.*" *By G. Bernard Hughes.* (*Hutchinson's Scientific and Technical Publications, London*, 1943; *pp.* 128; *Figs.* 63.)

The aim of the author is to present, between two covers, the main features of the very extensive amount of information available on industrial lighting, such as that in Government Reports, in Codes of the Illuminating Engineering Societies in Great Britain and America, and in the publications of the E.L.M.A., and by leading firms in the lighting industry. All this information is presented in a concise and practical manner.

In Chapter I. ("Facts for Lighting Engineers") the author presents a "rating schedule" or appraisement table of lighting installations specifying ten important items, and in Chapter II. he discusses some of these, as contributing to the purpose of lighting, in fuller detail.

Subsequent chapters deal with Glare Lighting and Safety, Sources of Light, Industrial Requirements, Design of Lighting Installations, Maintenance, etc. These cover familiar ground and are aided by effective illustrations. The two final chapters are amongst the most useful in the book. In Chapter X. a summary is given of Statutory Regulations, up to the Factories (Standards of Lighting) Regulations, 1941, the requirements being stated in full, both as regards adequacy and sufficiency, and exceptions quoted. Chapter XI., which deals with production, assembly, and inspection processes, is also a useful one. Here the author discusses the choice and positions of lights in regard to the work for various operations, and mentions numerous practical difficulties that arise.

In a series of tabular appendices at the end of the volume are given definitions of units and terms used in illuminating engineering, foot-candle values for industrial processes, coefficients of utilisation, etc.

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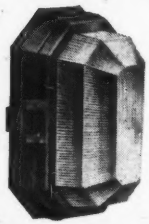

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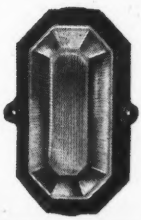

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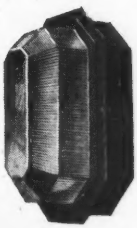

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National Security (Industrial Lighting) Regulations in Australia

Some time ago we gave particulars of the Code of Industrial Lighting developed in Australia (see Light and Lighting, November, 1942, p. 140). We have now been favoured with a copy of the regulations bearing the above title, issued by the Ministry of Defence in Australia, which embody the main features of the Code. The procedure in thus issuing Statutory Rules resembles that adopted in this country, but in Australia the actual schedule of values for industrial operations is reproduced, whereas in this country only the minimum of 6 ft.c. is mentioned in the Order, though the Production Departments also require compliance with the I.E.S. Code.

The general levels of values in the Australian Code resemble those in the I.E.S. Code, but, as indicated previously, the "ranges" are slightly different, the two lowest categories (2-4 and 4-6 ft.c.) being fused into one (2-5), and the next higher being 5-10. Above that ranges are identical.

A point of interest is the adoption of the clauses in the Australian Code relating to limitation of glare and brightness of fittings. It will be recalled that these prescribe that 300 and 500-watt lamps are to be used with open-type reflectors under certain conditions, the cut-off angle being specified according to the height of suspension. Also limits are set to the brightness of diffusing fittings, which is restricted, for specified heights, to 500-1,200 lumens per sq. ft.—values on the low side which may be desirable but would seem rather difficult to adhere to in the case of industrial lighting installations.

Another point of interest is that reference is made to "any room or office in which continuous clerical work is performed" (in which open-type reflectors are forbidden), so that apparently offices as well as factories may come within the scope of this Order.

A more recent departure is the series of rulings by the Industrial Welfare Division of the Department of Labour and National Service permitting exemptions (or rather tolerances) in the case of existing installations which come close to standard (see I.E.S. Lighting Review, Australia, April, 1943). These tolerances are designed to economise manpower and materials in re-lighting existing installations.

Exemption is to be granted, for instance, if three-quarters of the prescribed value of illumination is provided, and there are also concessions in regard to the clauses affecting glare—for example, those specifying that 300 watt or 500 watt lamps in open reflectors shall not be used below a certain height; whilst if the brightness of diffusing glassware is not more than 20 per cent. above the prescribed value no alteration will be required.

The standards laid down for machine tool lamps will not, however, be relaxed, "since these are prolific sources of glare."

These exemptions apply to *existing installations*. Where alterations to existing installations are made, the condition defined in the Order must be specified.

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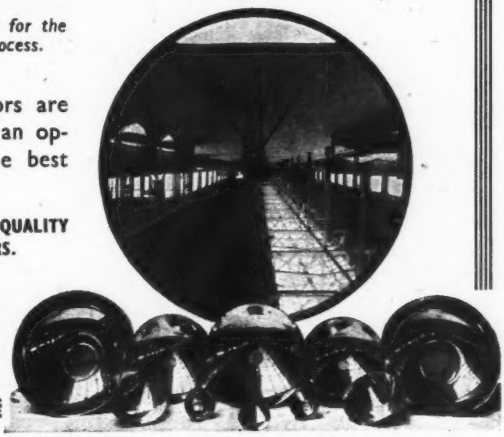

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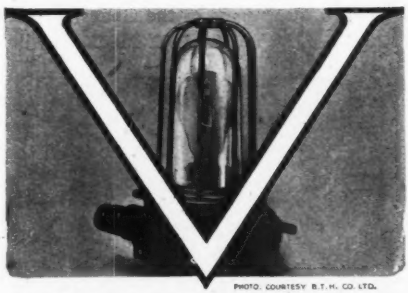

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VITREOSIL *in* MINE LIGHTING

The application of the super-pressure Mercury Lamp to mine lighting was described in Light & Lighting (September, 1940, issue). Transparent VITREOSIL, pure fused silica, has been manufactured for over 30 years and is used in the super-pressure Mercury Vapour Lamp on account of its high heat resistance.

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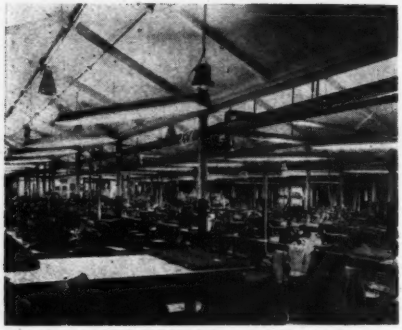
Lighting a Sewing Room

In the making of service uniforms a really good illumination "at the needle point" is essential. The work requires considerable care, and in many cases (e.g., uniforms for A.R.P. services, the



police and the Air Force) relatively dark colours are used.

When it was recently decided to improve the lighting in the sewing room of Messrs. J. Smith and Co. (Derby), Ltd., who specialise in the making of uniforms, Crompton 5-ft. 80-W fluorescent tubes and lighting equipment were installed. About 75 tubes were used, placed diagonally across the double row of sewing machines, spaced at approximately 6 ft. centres and mounted 9 ft. high.

The reflectors are of the "open top" type so that a certain amount of light is thrown upwards and the so-called "tunnel effect" is eliminated. Alternate fittings can be switched on if desired, thus permitting some adjustment to varying daylight.

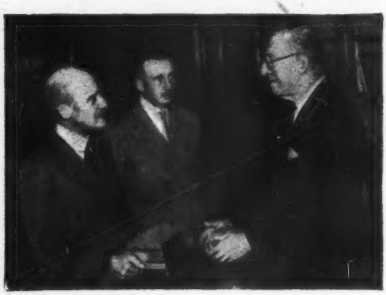
An interesting feature is the suspension of lighting units between two strained catenaries with vertical drop wires terminating in cable grips to the catenaries and loops to the lighting unit hooks. This method of fixing permits considerable variations of positions of units to suit the rearrangement of working areas.

Discharge Lamp Lighting

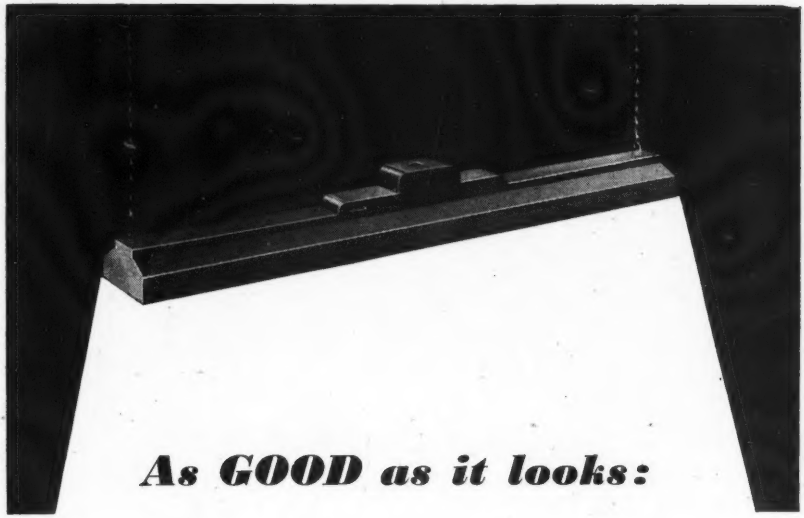
Attention is drawn to the Discharge Lamp Lighting (Control) Order 1201, 1943, which came into force on September 1. In substance this forbids the installation of discharge lamps (the power consumption of which is in excess of 10 watts) and accessory equipment except under licence of the Minister of Works. This Order, however, relates to new installations. It does not prohibit the use of discharge lighting apparatus already in use on or before the date on which the Order came into force (September 1), nor the renewal of apparatus in a discharge lamp installation already in operation before the said date.

Mr. J. Y. Fletcher

The accompanying illustration shows a recent pleasant incident, the presentation of a silver cigarette box by Mr. A. H. Railing and Mr. Leslie Gamage, on behalf of the Board of the General Electric Co., Ltd., to Mr. J. Y. Fletcher, who



has just completed fifty years of service with the company. During over forty years Mr. Fletcher has been closely associated with the development of Osram lamps. He has been closely identified with the E.L.M.A. since its foundation and has served several terms of office as chairman. He is also a valued I.E.S. member of very old standing.



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Association for Scientific Photography

The first meeting of the 1943-44 session of the above Association was held at the Middlesex Hospital (London) on September 18, when papers on Clinical Photography were read.

Future meetings will take place monthly. In October the use of photographically sensitised metal, wood, and plastics in industry will be discussed, and in November oscillographic recording. In December an exhibition of scientific photographic apparatus, arranged jointly with the scientific and technical group of the Royal Photographic Society, will take place.

Further particulars of the Association's activities may be obtained from the hon. secretary at Tavistock House North (1st floor), Tavistock-square, London, W.C.1.

E.I.B.A. Change of Address

The Electrical Industries Benevolent Association has now found office accommodation in London again, and in future its address will be 32, Old Burlington-street, London, W.1.

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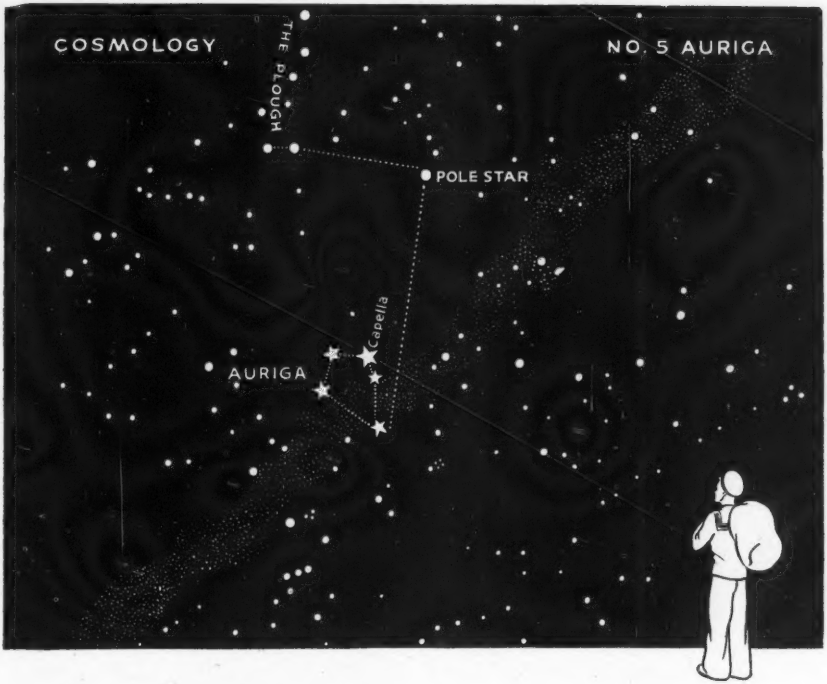

Auriga, the constellation resembling a child's kite on the above map, contains the exceptionally brilliant star Capella, previously mentioned in our star map showing Orion.

In the apparent rotation of the stellar system from east to west Auriga passes close to the Zenith—that part of the sky directly overhead—and lies, as shown above, somewhat to the left of a line drawn at right angles to that joining the pointers of the Plough to the Polestar.

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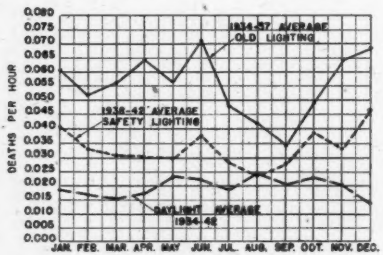
Traffic Safety in Wartime

A paper recently read by Mr. L. J. Schrenk in the U.S.A. (*Illum. Engineering*, July, 1943, p. 353) reviews systems of diminished street lighting ("blackouts," "dimouts," and "brownouts") under war conditions, and emphasises the benefits of "traffic safety lighting" in diminishing accidents. He recalls President Roosevelt's recent remark that 40,000 people were killed (in the U.S.A.)



Showing average motor vehicle fatalities per hour of street lighting before and after the introduction of safety lighting in Detroit.

during 1941 through automobile accidents alone, and quotes experience in Detroit, where the relation between street lighting and safety has been studied with special care.

Of special interest are the curves here reproduced showing the remarkable diminution in accidents since safety lighting was introduced in that city. Mr. Schrenk also draws attention to another point—the liability under ordinary conditions for accidents to rise during the September-December period, because drivers have been lulled into a sense of security during summer conditions. Conversely the diminution in accidents during the January-March period might be partly ascribed to adaptation to conditions of darkness.

Local Lighting With Diffusing Units

The advantages of the 5-ft. 80-W. fluorescent tubes are so generally stressed that people are apt to overlook the fact that some at least of their advantages can be obtained from ordinary filament lamps with a little ingenuity. The accompanying illustration, which appeared in connection with Mr. W. G. Darley's paper on "Lighting and War Production," read before the American I.E.S. (*Illum. Engineering*, June, 1943, p. 323), shows a series of large area low

Large Area Low Brightness Units for Filament Lamps.

brightness units based on the combination of diffusing hoods with filament lamps. By such means one can obtain all the good qualities of absence of glare, diffusion, and soft shadows characteristic of fluorescent lamps. Even a visual resemblance to daylight might be secured by interposing a slightly tinted screen. The efficiency must, of course, be very much less than that of a fluorescent lamp, and the difference in this respect is accentuated if correcting screens (necessarily absorbing light) are introduced. But the supply of fluorescent tubes admittedly cannot satisfy the demand under present conditions, and if one cannot get the best it is well to bear the second best in mind.

The Inspection of Precious Metals

Advantages of Fluorescent Lighting

Fluorescent lamps have proved to have special advantages in certain industries. Amongst these may be included trades and processes involving the use of precious metals where colour is often of importance and where the avoidance of glare and glitter from shiny surfaces is always a consideration of moment.

For the inspection of platinum, gold, silver, etc., good lighting, both as regards quantity and quality, is important. Some experience of the requisite conditions has recently been gained in the inspection shop of a well-known firm of metallurgists and assayers in the Midlands. Here fluorescent lighting (Mazda 80-watt 5-ft. tubes in 2-light continuous trough reflectors) have replaced glass shade pendant lights.

The general nature of the installation will be gathered from Fig. 1. The fittings have been accommodated between the ceiling trusses with the object of making the double lamp troughs as inconspicuous as possible, and are mounted 7 ft. 6 in. above the floor. An average illumination of 21 foot-candles is obtained on the working plane. Trouble due to reflected glare and glitter has disappeared and there has been a marked improvement in the well-being of the employees.

Fig. 2 is also interesting in affording a solution to what has proved a rather difficult problem—the lighting of balances. These balances have an extra beam and are marked in vertical gradations. The beam is a vernier type of measuring scale, fine differences in weighing being achieved by the addition of very small counter-weights.

In this work accuracy is vital and everything possible should be done to facilitate quick and easy vision by the operator. It has been found that one fluorescent lamp will serve to illuminate two adjacent balances, whereas hitherto one 100-watt concentrating fitting was provided for each. A small white matt reflecting surface is placed inside the front and at the floor of the balance proper and reflects light on to the vertical beam.

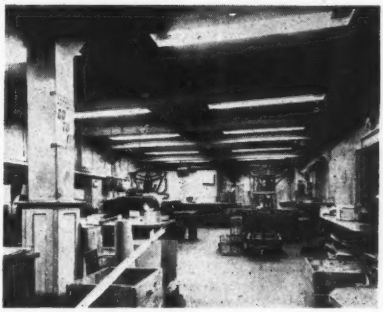


Fig. 1. Fluorescent Lighting in a shop devoted to the inspection of precious metals. The fittings are mounted between the ceiling trusses with the object of rendering them as inconspicuous as possible.

We are indebted to the British Thomson-Houston Company, Ltd., for particulars of this installation, for which the contractors were Messrs. Stuart Electrical Co., Ltd., of Birmingham.

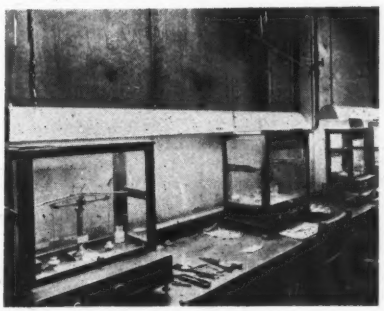


Fig. 2. One double fluorescent fitting serves to illuminate two adjacent balances and the space between them.

Post-War Domestic Lighting

We note that a joint conference on the above subject was arranged by the I.E.S. Bradford Group on September 23, when members of a number of women's organisations interested were invited to attend. Representatives from other local bodies, such as the Civic Society, were also invited. Through the courtesy of Miss Caroline Haslett, Mrs. L. G. Davies, of London, was invited to open the discussion. Such informal discussions seem likely to prove very helpful at the present time when lighting reconstruction is "in the air."

Colour and the Poetry of Light

The addresses on this subject, illustrated by demonstrations, given by Mr. R. Gillespie Williams last year, were much appreciated and we understand that talks on similar lines have been arranged by a number of I.E.S. Centres and Groups during the session now commencing.

We note that Mr. Gillespie Williams has undertaken to give talks in Derby (October 5), Bradford (October 14), Nottingham (October 29), Leicester (November 2), and Birmingham (December 10). Another author who has a number of engagements is Mr. J. W. Howell, who is dealing with lighting in connection with the textile industry in Manchester (October 14), Glasgow (October 29), and Leeds (February 7).

Physiological Aspects of Lighting

In view of the interest taken in this subject at the recent Conference in Oxford (see "Light and Lighting," August, 1943, pp. 113-116) and the proposal to form a joint committee to explore its relation to illuminating engineering, it is of interest to note that the I.E.S., Cardiff Centre, has this matter ii hand.

On October 9 an address on this topic is to be delivered by Dr. J. H. Shaxby at the Mackworth Hotel, Swansea. We are asked to mention that any I.E.S. members able to attend will be very welcome, and should get in touch with the local secretary, Mr. S. G. Turner, Mervyn House, Frederick-street, Cardiff.

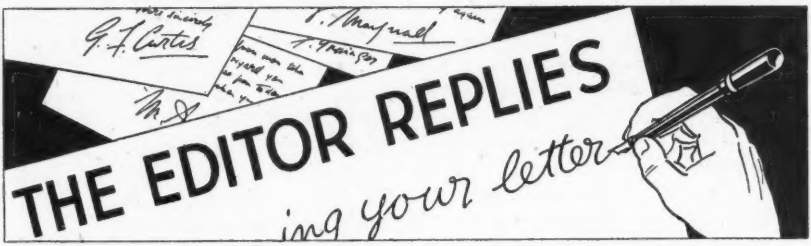
Colour Photography

The thirteenth meeting of the Colour Group was held in the lecture theatre of the Science Museum on September 9, when an audience including a number of members of the photographic profession, as well as members of the Group, listened to a two-hour lecture by Mr. J. B. Reid, who took as his subject "A Review of the Theory of Colour Photography."

The subject is a complicated one. Additive reproduction, as employed in the Dufay colour system for example, presents no theoretical difficulties. The picture is taken by exposing the sensitive emulsion through a three-colour mosaic filter which, actually, is incorporated in the film. For subtractive reproduction, however, colorants with the necessary properties do not exist. Further, the spectral sensitivities of the photographic emulsions used should have negative portions and this is an impossibility in the ordinary photographic process, since a negative reverses tone values by rendering them to a negative power, not by subtracting them. Various methods which have been proposed for introducing these negative portions and various compromises for getting round the difficulty were described by the lecturer who, in most cases, gave the mathematical analysis by which the conditions to be fulfilled could be determined for each method.

A great deal of work on the subject has been done, notably in America, by D. L. MacAdam, who has published several papers in the "Photographic Journal" (see, especially, Vol. 81, p. 333, July, and p. 373, August, 1941). Mr. Reid gave an account of MacAdam's work and indicated the lines along which it was probable that progress in the subject would be made. It was, he said, usual in any system of colour reproduction to aim first at accurate representation of greys and of flesh tints and then to get the best results obtainable for the other colours.

At the conclusion of the lecture the chairman, Mr. J. Guild, said that he thought the photographic research workers had a specially difficult problem in that they might achieve a result which was perfect from the physical point of view but which was aesthetically quite unsatisfying.



Mr. G. F. Cole, one of the many I.E.S. members serving with the Forces, has responded to our recent invitation to readers to suggest matters affecting the future of the Society. The point he raises is a vital one—**the chances** that lighting will offer to **Serving members** when the war is over. No doubt there will be plenty of opportunity—but, he suggests, the Society should be prepared to put forward a case for the early release from the Services of members of the I.E.S.

In this connection Mr. Cole also proposes the formation of an "**employment exchange,**" so that employers in need of technical staff could obtain such staff through the Society. In the years preceding the war there were, I believe, limitations to such a scheme—notably the fact that offers of employment were relatively few. But the Society has grown in numbers and prestige since then, and in the future the position should be very different. Mr. Cole's constructive suggestions have been passed on to the right quarter—and we shall welcome any others that members have to offer.

My attention has been drawn to a statement that **illuminated slides,** giving the **names of streets,** are being installed in the City of London. Mr. Tapsfield tells me, however, that this is not a new development. Illuminated plates at the sides of bollards, bearing the names of streets, have been in use in Holborn for about two years. War conditions have apparently hindered the general development of this idea.

I am indebted to Mr. Stanley for a summary of the various steps leading to the final adoption of 230 volts (both A.C. and D.C.) as the **sole standard voltage** in this country. I rather gather that the gravitation to their value was based largely on the consideration of existing usage and ease of conversion of existing installations, though it is quite possible that, from the lighting standpoint, this value might still have been preferred, even if a completely free choice, independent of existing usage, had been possible.

I have been reminded that the standard voltage in the United States is about half the above figure, and the same, I believe, applies to Japan. From the general standpoint it might be argued that the lower voltage is safer. On the other hand for a given load it means a higher current and a bigger voltage drop in the mains—a consideration of moment at this time when advances in standards of artificial lighting tend to impose higher loads on exising mains systems. It is true that somewhat stronger and more efficient filament lamps can be made for the lower voltage, but this point may be of less importance in the future when fluorescent lamps will be more widely used.

My attention has been drawn recently to a rather interesting point in connection with **the Diversity factor of Lighting installations.** If "Service values of

average illumination," as specified in the I.E.S. Code, are adopted, it obviously results in a better installation if one also limits the variation of illumination over the working area (e.g., by stipulating that the minimum illumination should not be less than 70 per cent. or 75 per cent. of the average value). By so doing we ensure that the lowest illumination never falls **below** a certain figure.

What, however, is the position when **minimum** values of illumination are specified as in the Factory Act? The effect then is the opposite, i.e., to require that the illumination shall nowhere be *more* than a certain value. I remember this point was raised in connection with the original **street lighting specification**, based on minimum values. It was then argued that it would be absurd, in an area where light was also meagre, to penalise those who furnished more light than others in some portions of the street.

There is some force in this argument. Perhaps it does not apply in the same way to an **interior lighting installation** where the minimum illumination may be 10 foot-candles or more and a diversity factor of, say, 1.5:1 would permit illuminations up to 15 ft.c. It might then be considered that to permit higher illuminations of, say, 20-25 ft.c. in certain places would prejudicially affect workers elsewhere—though I confess this argument does not appeal to me very strongly, especially as such big surpluses of illumination are most unlikely in practice!

In response to comments on the note on "The End of Summer Time" in our last issue (August, 1943, p. 112), I should explain that the alleviations which the I.E.S. had in mind were of a minor character, as indicated in the "Aids to Movement" report. They would not affect materially the black-out as a whole, but would give a little relief at certain places. The position in this country is admittedly quite different from that in the United States, where the "**Dimout**" seems to be mild compared with our "**Blackout**," and where a still milder but more general measure, the "**Brownout**," which is not to affect materially automobile or street lighting, seems now to be in prospect.

My attention has been drawn to a statement in the Press that experiments were recently made in Blackburn, during the period 8.30 to midnight, with a **modified system of wartime street lighting** based on the use of 15-watt lamps controlled by a "master switch." I have no further information. I notice, however, another statement to the effect that in Cape Town, South Africa, the blackout has now been substantially alleviated—perhaps another pointer to better things.

I have again been reminded of the expediency of making "Light and Lighting" a sort of forum for "**news and views**" from I.E.S. members scattered about Great Britain who have few chances of meeting in existing circumstances. With this suggestion, as previously stated, I cordially agree. It should be possible to develop this idea more fully in the good times to come, when paper restrictions are less stringent. Meantime let us do what we can.

I am further reminded of this suggestion by a member who sends me a copy of the circular entitled "**Fourteen Points**" distributed for this purpose some years before the war. In this appeal fourteen suggestions were made. Not all of them are appropriate at the moment. But we are still open to receive notes on interesting lighting installations, problems, appointments, personal doings, etc.—in short, anything that comes within the description of NEWS.